Maestro 3G Industrial Router

GSM/GPRS/EDGE/3G/UMTS Modems

USER MANUAL

Rev.2.1

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TABLE OF CONTENTS

TABLE OF CONTENTS 2
1.1 Configuring client PCs 5
1.1.1 Windows 2000 5
1.2 Default Router settings 7
1.3 Router Setup 7
2 PRODUCT SPECIFICATIONS 8
2.1 Power Supply 8
2.1.1 AC Mains Supply 8
2.1.2 DC Supply 9
2.2 Mechanical detail 10
2.2.1 Top 10
2.2.2 Bottom 10
2.2.3 Physical 10
3 LED INDICATORS 11
3.1 Identification 11
3.2 Error indication 14
4 CONFIGURING THE ROUTER 15
4.1 LAN configuration 16
4.2 DNS Configuration 17
4.3 DHCP Configuration 18
4.4 APN Name configuration 19
4.5 NTP Client – Network Time Protocol 21
4.6 IP – IP tunnel 22
4.6.1 Warning 22
4.6.2 Prerequisites 22
4.6.3 Example 23
4.6.3.1 Site A Configuration 23
4.6.3.2 Site B Configuration 24
4.6.4 Further reading 24
4.7 Port Forwarding (DNAT) 25
4.8 Bounce (DNAT + SNAT) 26
4.9 Mirror 27
4.10 Routing and Routes 28
4.11 Dynamic DNS 29
4.12 SIM Configuration 30
4.13 Connection Preference 31
4.14 Scheduled Daily Reconnect 32
4.15 Password 33
4.16 Router Status 34
5 GENERAL OPERATION 36
5.1 Restart Connection 36
5.2 Restart Router 37

6 DIAGNOSTIC TOOLS 38
6.1 Ping 38
6.2 Communication log 40
7 SMS MESSAGES 41
8 PREPAID RECHARGE 42
9 COMPLETE CONFIG 43
10 UPGRADE 44
11 GLOSSARY 45
12 REVISION INFORMATION 45

Quick Start Guide

The Maestro 3GIRrouter is a self-contained router solution, so no other devices such as power supplies or modems are required. It contains a built-in power supply and a built-in GPRS/EDGE/3G engine capable of 216kb/s downlink speed.

To immediately start using your router, follow these simple steps:

1. Insert your SIM card in the SIM Card socket if one is not already installed.
2. Connect the router in to a mains socket.
3. Connect the PC to the router using a crossover Ethernet cable*
4. Switch the router on and wait until the status LED is no longer red. Orange indicates GPRS, Green indicates EDGE and blue indicates UMTS.
5. Switch the PC on.
6. The router will assign an IP address to the PC.
7. Start browsing the Internet.

* If the Maestro 3GIRis connected to a switch, then a normal Ethernet cable will also work.

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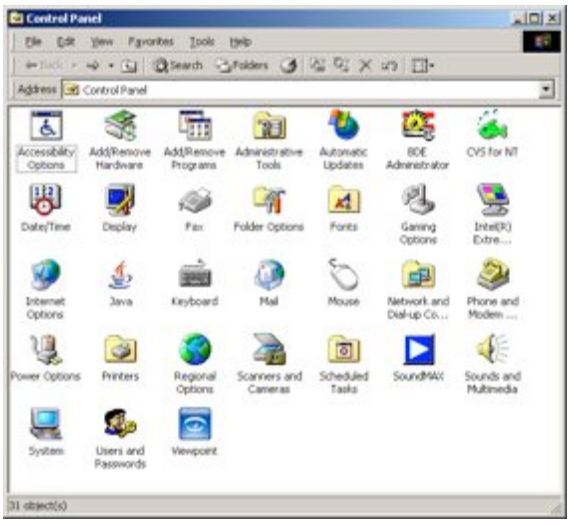
1.1 Configuring client PCs

Each client PC must be set to get is IP address details from a DHCP server. The SPRi, with its built-in DHCP server will assign the following details:

- IP Address range
- Default gateway
- DNS Server

1.1.1 Windows 2000

To enable auto-configuration in Windows 2000 (if it is not already configured), open the Control Panel and double-click the **Network and Dial-up connections** icon.



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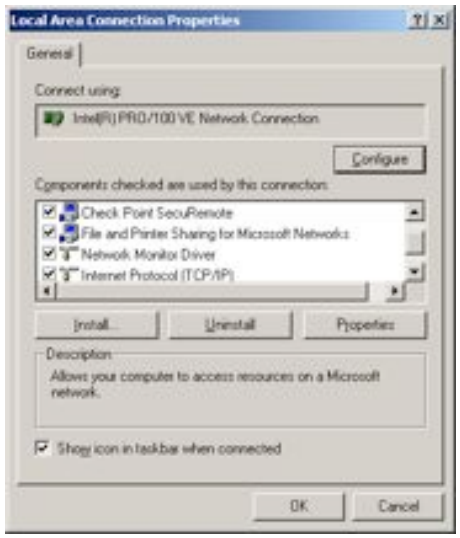
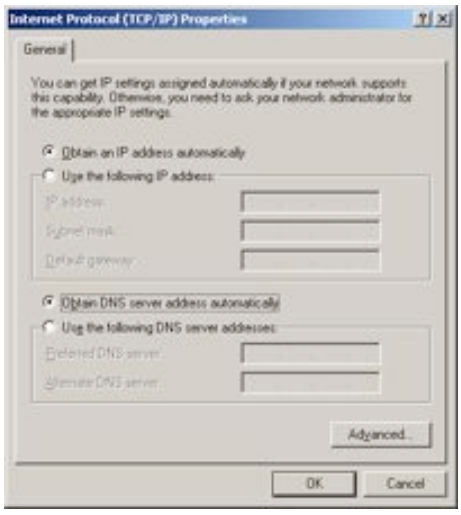
This will give you a list of LAN and Dial-up connections.

1. Double click on **Local Area Connection**.
2. Click on the **Properties button.** You will be presented with a pop-up window similar to this one:



3. Select the **Internet Protocol (TCP/IP)** line and click the **Properties** button
4. You will be presented with another pop-up like this:



5. Make sure that the settings shown in your pop-up window conform to those shown above.
6. Click the **OK** button.

Your PC is now configured for automatic configuration. Once it is restarted, it will get its IP address details from the DHCP server. Note that you will have to configure the IP address on your PC manually if you have disabled the DHCP server.

If you are uncertain, ask your network administrator to assist you in configuring your PC.

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1.2 Default Router settings

The router ships with the following default settings and services:

Setting	Default value
User name	admin (fixed)
Password	Password
IP Address	192.168.217.1
Subnet Mask	255.255.255.0
DHCP Server	Enabled
DHCP Pool	192.168.217.10 – 192.168.217.100
DNS Server	Enabled
APN name	internet

1.3 Router Setup

Once the router has started up, it can be configured via an interactive web page. The default address of the router (when it is shipped from the factory) is **192.168.217.1**, so the web address will be http://192.168.217.1/

If the default IP address has been changed previously, make sure this information is safely stored.

When accessing the Maestro 3GIR for the first time from a browser, the following password dialogue will appear. Enter the default username (“admin”) and password (“password”) to gain access to the Maestro 3GIR configuration interface.

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2 PRODUCT SPECIFICATIONS

2.1 Power Supply

2.1.1 AC Mains Supply

The Maestro 3GIR may be powered from 90VAC to 265VAC. The mains supply is connected to the terminal block as shown in the following picture:

Important Notices

Even though the Maestro 3GIR will operate without an earth connection, this should always be connected for safety reasons.

Ensure that the supply wires are inserted and fixed in the correct terminals.

Always use SABS approved mains cables.

Do not use frayed cables.

Please take care when connecting the mains supply, as the possibility of an electric shock exists if the installer inadvertently touches the live or neutral wires or connects the supply to the wrong terminals.

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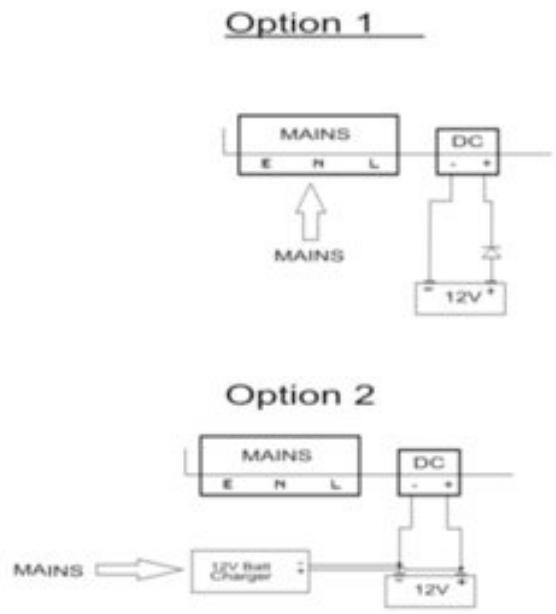
2.1.2 DC Supply

An optional Low voltage DC Supply Cable allows the integrator to configure the Maestro 3GIR in such a way that a backup battery can keep the router alive after loss of mains supply.



Please note that the Low voltage DC supply must be capable of supplying at least 18VA. This means that, at 12V, the supply must be able to supply 1.5A. This is not the continuous current that the Maestro 3GIR requires, but the pulses required when the router is in communication during a download.

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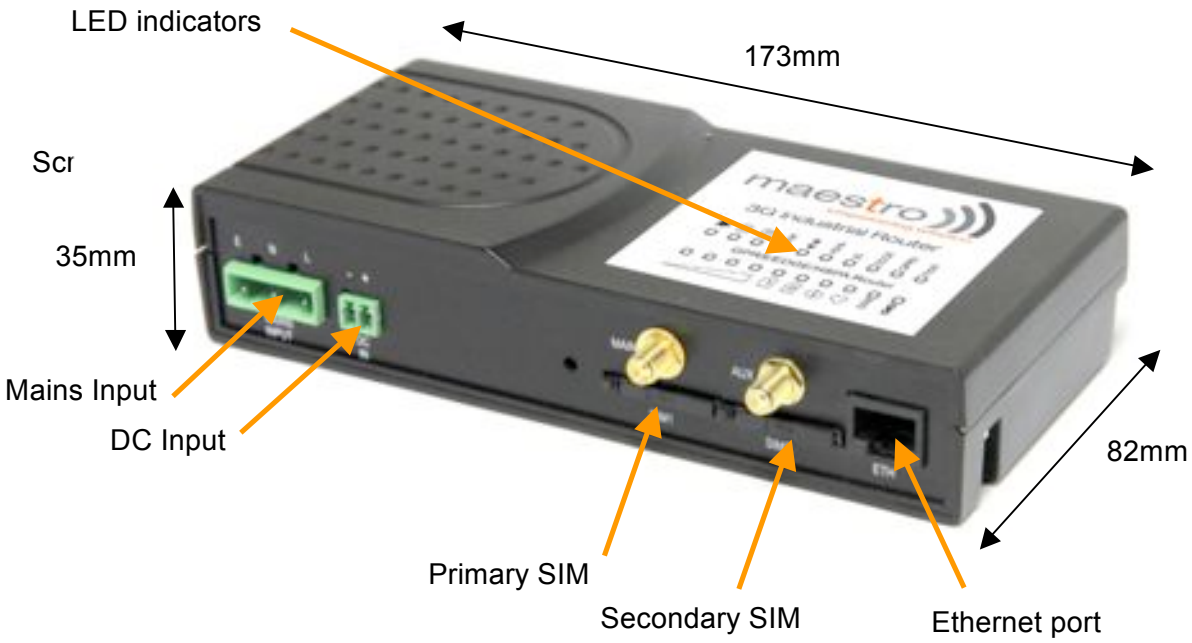
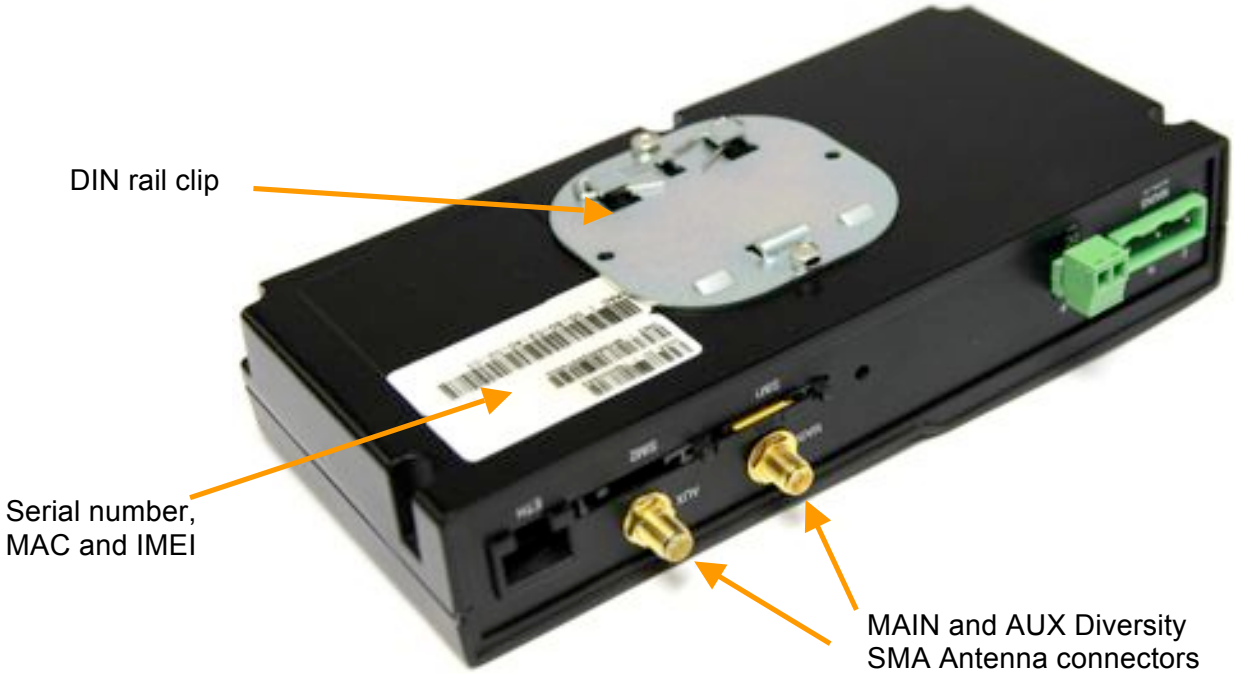
2.2 Mechanical detail

2.2.1 Top



2.2.2 Bottom



Fixing is via the DIN rail clip mounted on the bottom of the casing.

2.2.3 Physical

Size	82mm x 173mm x 35mm
Weight	750g

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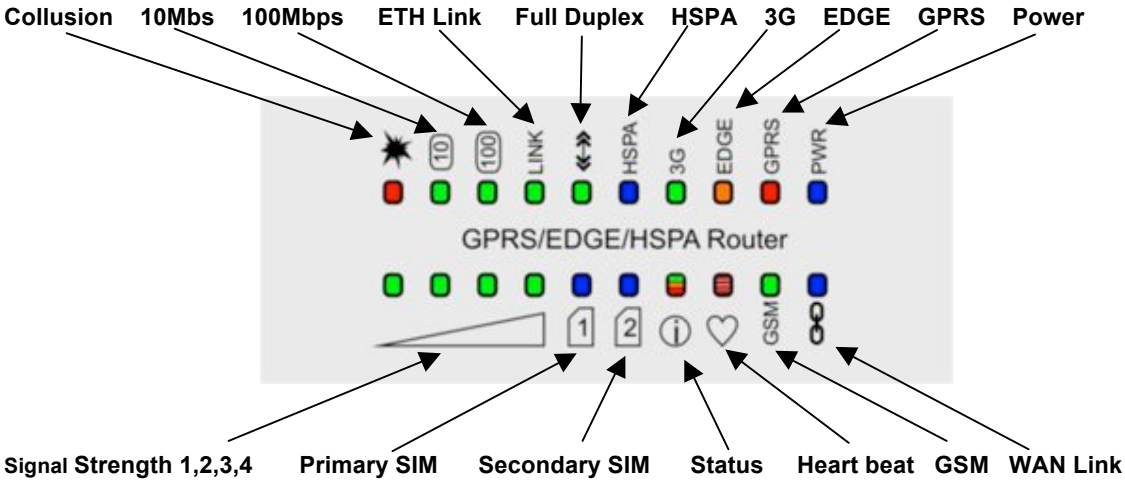
Casing material	Metal alloy
Temperature rating	-20°C to 60°C
Humidity	Up to 90% RH non-condensing

3 LED INDICATORS

3.1 Identification



Signal Strength

COLOUR	INDICATION
GREEN	Indicates the Received Signal Strength
1,2,3,4	> -63dBm
1,2,3	> -73dBm
1,2	> -83dBm
1	> -93dBm
All OFF	No sufficient GSM coverage.

Primary SIM

COLOUR	INDICATION
BLUE	Primary SIM is selected

Secondary SIM

COLOUR	INDICATION
BLUE	Secondary SIM is selected

Status

COLOUR	INDICATION
Flashing RED	Network related Error is present see 3.2 below
Flashing ORANGE	SIM related Error is present see 3.2 below
Flashing GREEN	Logged onto network busy attaching
GREEN	Attached to network

Heart beat

COLOUR	INDICATION

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Flashing RED	All Okay
RED	Error: Connection application is not running

GSM

COLOUR	INDICATION
Flashing GREEN	Data connection is present
GREEN	No data connection

WAN Link

COLOUR	INDICATION
BLUE	WAN is CONNECTED

Collusion

COLOUR	INDICATION
RED	Error: Collusion detected on LAN network

10Mbps

COLOUR	INDICATION
GREEN	LAN speed: 10Mbps

100Mbps

COLOUR	INDICATION
GREEN	LAN speed: 100Mbps

ETH Link

COLOUR	INDICATION
GREEN	LAN Link detected

Full Duplex

COLOUR	INDICATION
GREEN	LAN Duplex: FULL
OFF	LAN Duplex: HALF

HSPA

COLOUR	INDICATION
BLUE	Current connection: HSPA

3G

COLOUR	INDICATION
GREEN	Current connection: 3G

EDGE

COLOUR	INDICATION
ORANGE	Current connection: EDGE

GPRS

COLOUR	INDICATION
RED	Current connection: GPRS

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Power

COLOUR	INDICATION
BLUE	Power is present

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3.2 Error indication

If the Status LED is flashing fast on and off, the signal strength LED's becomes error indicators.

Status

COLOUR	INDICATION
Flashing RED	Network Related Error is present see Signal strength LED's to decode.
Flashing ORANGE	SIM Related Error is present see Signal strength LED's to decode.

Signal Strength

COLOUR				INDICATION
				SIM NOT READY
				SIM NOT PRESENT
				SIM FAILURE
				PIN REQUIRED
				PUK REQUIRED
				NOT SEARCHING
				SEARCHING…
				REGISTRATION DENIED
				REGISTRATION UNKNOWN

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4 CONFIGURING THE ROUTER

Once you have logged in to the router web interface, you can click on the **Configuration** menu item. You will be presented with a page similar to the one below. From here, all the router options can be configured.

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4.1 LAN configuration

Click on the LAN Configuration link from the main menu. The screen shown below will be displayed. Enter the desired IP address in the **IP Address** edit-box. The default subnet mask is **255.255.255.0**, but can be changed if the need arises. The LAN IP address only has to be changed if you already have a pre-existing network.

For most configurations the default values do not have to be changed.

Be careful to change this, as this is the IP you are using to access the web interface.

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4.2 DNS Configuration

The Maestro 3GIR has a built-in DNS caching system. To automatically have DNS servers assigned, simply check the "**Use Peer DNS**" check-box.

To specify your own DNS server manually, uncheck the checkbox and enter two DNS servers in the edit-boxes shown. It is advisable to always enter two DNS servers to ensure that the DNS service keeps working in the event of an upstream DNS server failure.

Click on **submit** to save the DNS server settings. The settings will take effect immediately and the unit does not have to be restarted.

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4.3 DHCP Configuration

The Maestro 3GIR has a built-in DHCP server that automatically assigns IP addresses, DNS servers and default gateway information to the client PCs that are connected to it. By default, the DHCP server is enabled and will service IP addresses from a pool starting with 192.168.217.10 and ending with 192.168.217.100 for up to 90 PCs.

The default IP pool can be changed by clicking on the DHCP configuration link from the main menu. Enter the starting and ending addresses in the edit-boxes and click **submit** to save the changes.

The new DHCP pool will become active immediately when the changes are saved.

Uncheck the DHCP Server check-box to disable the DHCP server. When you click submit, the DHCP server will immediately be disabled and the setting will be saved for subsequent restarts.

Note: Care must be taken when configuring the IP address pool so that it falls within the netmask assigned to the IP Address of the router.

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Incorrect DHCP ranges and netmasks will cause client PCs to be unable to reach the APN or even be assigned IP addresses.

4.4 APN Name configuration

To change the APN that the Maestro 3GIR connects to, click on the APN name change link. The default APN name (**internet**) is shown in the edit-box. Change this to the desired APN name, observing capitalisation. Please note that your SIM card has to be activated for a different APN name if you want to use another APN. Also note that the **Primary** and **Secondary** SIM each has its own **APN configuration**.

If your APN requires a username/password authentication, enter your username in the username field and the password in the password field. Note that these fields must not be empty, even if your APN does not require authentication.

Choose the authentication method from the drop-down box. Your APN provider will be able to assist you with the authentication method.

Click **submit** to store the new APN name. Note that the HSDPA connection will have to be restarted in order for the new APN name to take place. Click on the Restart Connection link from the main configuration screen.

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Check the Status page to make sure that the connection has been re-established and that the APN has assigned the correct IP address to the router.

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4.5 NTP Client – Network Time Protocol

The Maestro 3GIR has a built-in time synchronisation client that will keep the router's time correct whenever it re-connects to the Internet. This is important for tracking events in the Communication log.

Enter the DNS name or IP address of your upstream NTP server and click submit to save the changes.

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4.6 IP – IP tunnel

4.6.1 Warning

Tunnels can be used to do some very unusual and very cool stuff. They can also make things go horribly wrong when you don't configure them correctly. If you do this wrong you will most certainly ***brick*** your router.

To configure point-to-point tunnelling, an IP-IP tunnel must be created. The Maestro 3GIR supports standard IP-IP tunnelling and can interoperate with other Maestro 3GIR routers or Cisco routers using IP-IP tunnelling.

4.6.2 Prerequisites

1) You must test this ***before*** you go to site…
2) You need static IP addresses on the WAN side of each router (so, 2 of them)
3) The LAN subnet on the 2 routers has to be different (you can not use 192.168.217.0/24 on both routers)

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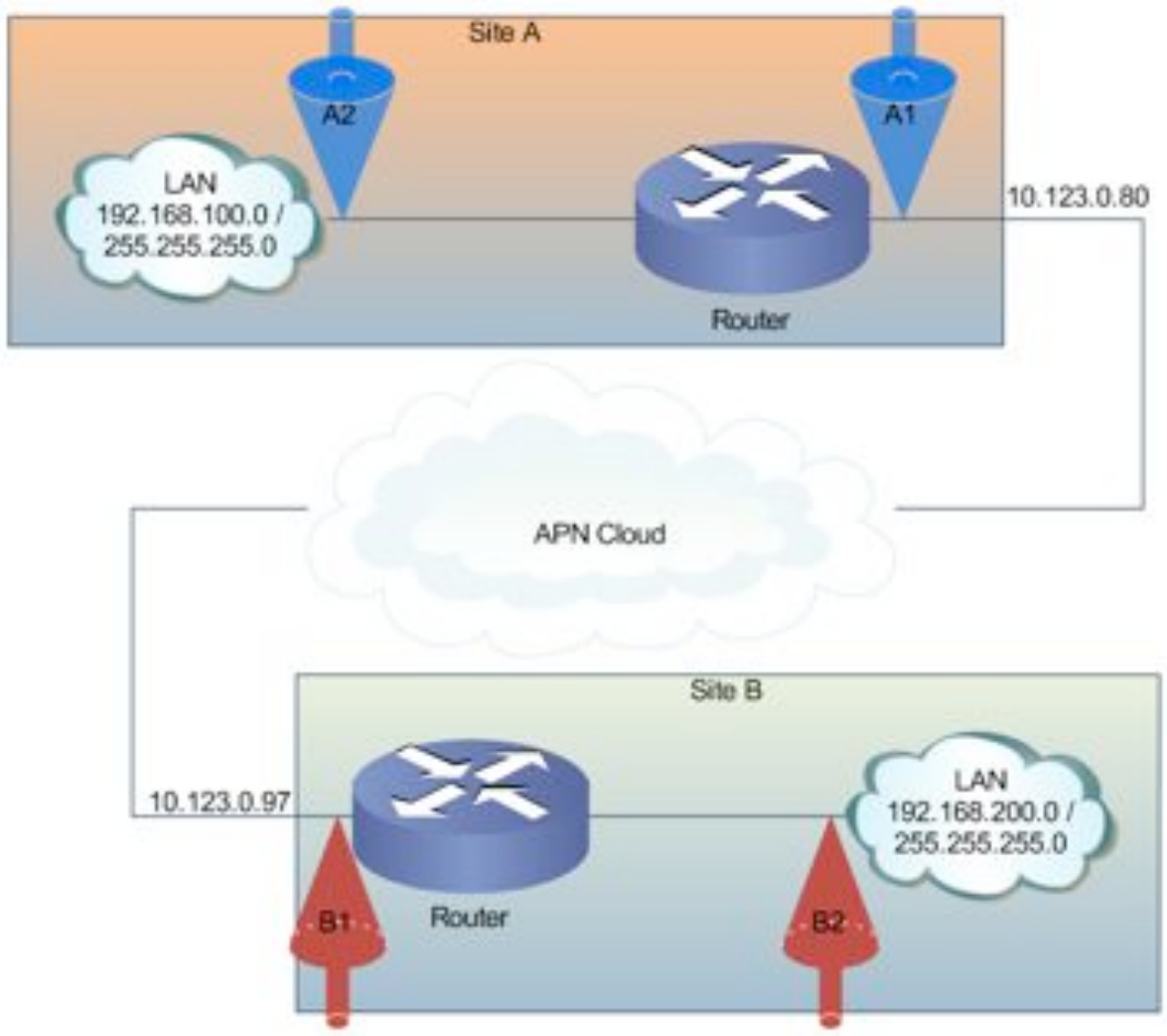
Example

Let's say you have 3 networks: Internal networks A and B, and intermediate network C (or let's say, Private APN).

So, for **Site A** network, we have:
network 192.168.100.0 (A2 in the below diagram)
netmask 255.255.255.0
router 192.168.100.1
This router has address 10.123.0.80 on network C. This is A1 in the below diagram.

And, for **Site B** network, we have:
network 192.168.200.0 (B2 in the below diagram)
netmask 255.255.255.0
router 192.168.200.1
This router has address 10.123.0.97 on network C. This is B1 in the below diagram.



4.6.2.1 Site A Configuration

Open your browser and connect to the web interface of the *Site A* router. On the *Site A* router you will enter the network information of the *Site B* router. Enter the following values on the *IP-IP tunnel* configuration page:
Endpoint: 10.123.0.97
Network: 192.168.200.0
Netmask: 255.255.255.0

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After you entered the values hit the Submit button. The first halve of the IP-IP tunnel configuration is now completed.

4.6.2.2 Site B Configuration

Open your browser and connect to the web interface of the *Site B* router. On the *Site B* router you will enter the network information of the *Site A* router. Enter the following values on the *IP-IP tunnel* configuration page:
Endpoint: 10.123.0.80
Network: 192.168.100.0
Netmask: 255.255.255.0

After you entered the values hit the Submit button. The second halve of the IP-IP tunnel configuration is now complete. Your tunnel is ready to use.

4.6.3 Further reading

The use and configuration of IP-IP tunnels is well documented on the Internet. Google is your friend here! Some links:
http://lartc.org/howto/lartc.tunnel.html
http://www.shorewall.net/IPIP.htm
http://www.linuxfoundation.org/en/Net:Tunneling

Make sure you ***understand*** the fundamentals of IP routing and IP tunnelling and ***test*** your scenario before you take your equipment to site.
http://www.ralphb.net/IPSubnet/index.html
http://www.w3schools.com/tcpip/default.asp

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4.7 Port Forwarding (DNAT)

The Maestro 3GIR supports TCP port forwarding (also called DNAT). It enables the Maestro 3GIR to forward TCP and UDP connections received on its WAN IP to be forwarded to internal devices on the internal network.

In the above example, port 25 (SMTP) on the outside is forwarded to 192.168.210.2, port 25 on the inside. This allows you to host web servers, mail servers, etc. on the internal network and is ideal for remotely maintaining servers.

Click **Add** to add the DNAT entry to the DNAT table.

Click on the **Remove** link to remove the appropriate entry.

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4.8 Bounce (DNAT + SNAT)

This works in similar way than the basic DNAT. It will forward TCP connections coming into the router to an internal address. The difference is that, with this option, the internal server will always see the connection coming from the Router's internal LAN IP address. It is useful to have this for internal devices on which the default route cannot be changed/configured.

Click **Add** to add the Bounce entry to the Bounce table.

Click on the **Remove** link to remove the appropriate entry.

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4.9 Mirror

The Maestro 3GIR supports Mirror. It enables the Maestro 3GIR to forward TCP and UDP connections received on various ports to the specified IP.

Click **Add** to add the mirror entry.

Click on the **Remove** link to remove the appropriate entry.

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4.10 Routing and Routes

The Maestro 3GIR includes a fully manageable router which allows you to create routes to other subnets on your network via different gateways.

The above example shows routes to 10.10.10.0/24 via gateway 10.10.10.1 and 20.20.20.0/24 via gateway 20.20.20.1 already configured, with a third route I the process of being configured.

Click **Add** to add the route to the Maestro 3GIR routing table.

Click **Remove** to remove the appropriate route.

All routes are persistent across reboots.

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4.11 Dynamic DNS

Your external IP address can be updated at one of several dynamic DNS providers. Enter the details required and the Router will update the DNS as your assigned IP address changes.

Supported dynamic DNS providers:

- dyndns
- zoneedit
- changeip
- noip

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4.12 SIM Configuration

The Maestro 3GIR enables the user to use two networks one as primary and the other as secondary.

If **failover** is selected the Maestro 3GIR will automatically switch over to the secondary SIM if connection is lost and can't be re-established. If the connection remains on the secondary SIM, a reconnection will only be done on the Primary SIM when the scheduled daily reconnect (see section 4.14) is enabled.

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4.13 Connection Preference

The Maestro 3GIR enables the user to select the preferred connection type.

If for example UMTS is available in the area but the signal strength is lower than 30% it is better to force the connection to be GPRS/EDGE, this will enable the router to stay on the preferred connection type.

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4.14 Scheduled Daily Reconnect

By default the router will restart only it's WAN and LAN connection at 01:00. This time can be changed by selecting the desired interval from the drop down menu.

When selecting "Restart everything" the router will restart all its services at the desired time. The user can also decide to switch this function off although this is not recommended to ensure no network lock-up taking place.

The Scheduled daily reconnect will be applied and saved if you click the **submit** button.

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4.15 Password

The username is always **admin** and the default password is **password**. To change the default password, click on the Password link. The user configuration page will allow you to change the default password.

The user can also open the routers web interface from the Internet, this will enable the user to browse the web interface remotely via a private APN.

The password configuration will be saved if you click the **submit** button.

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4.16 Router Status

The Router Status page will show all the current information relevant to the operation of the router. For example: MAC address, the current network on which the Maestro 3GIR is registered, all the hardware and software versions and information on the SIM cards:

The **eth0** interface represents the LAN interface and the **ppp0** interface represents the WAN interface. The IP associated with the **ppp0** interface is the internet-facing address. All outbound traffic will go through NAT via this interface.

Signal strength must be at least 30% in order for a good connection to be established to the GSM network.

The module temperature can vary from 0 ºC to 95 ºC and must never exceed 100 ºC.

Click on “Routing table” to display the following:

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5 GENERAL OPERATION

5.1 Restart Connection

To restart your Internet or APN connection, simply click the Restart Connection menu option. This will restart the connection, using any new configuration changes made to the APN name and authentication details.

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5.2 Restart Router

To restart your router, simply click the Restart Router menu option. This will restart the router, making live any changes to the LAN IP address and/or subnet masks.

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6 DIAGNOSTIC TOOLS

There are a couple of tools that can be used to check connection to the Internet and provide additional information if no connection can be established.

6.1 Ping

The “ping” page can be used to check the connection to various other machines on the network.

Enter the IP address that you want to ping in the edit-box and press enter. The router will send 4 ping packets to the destination address and report each echo-reply.

If no replies are returned, it means that the remote IP address is not reachable from the router.

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The result typically looks like this:

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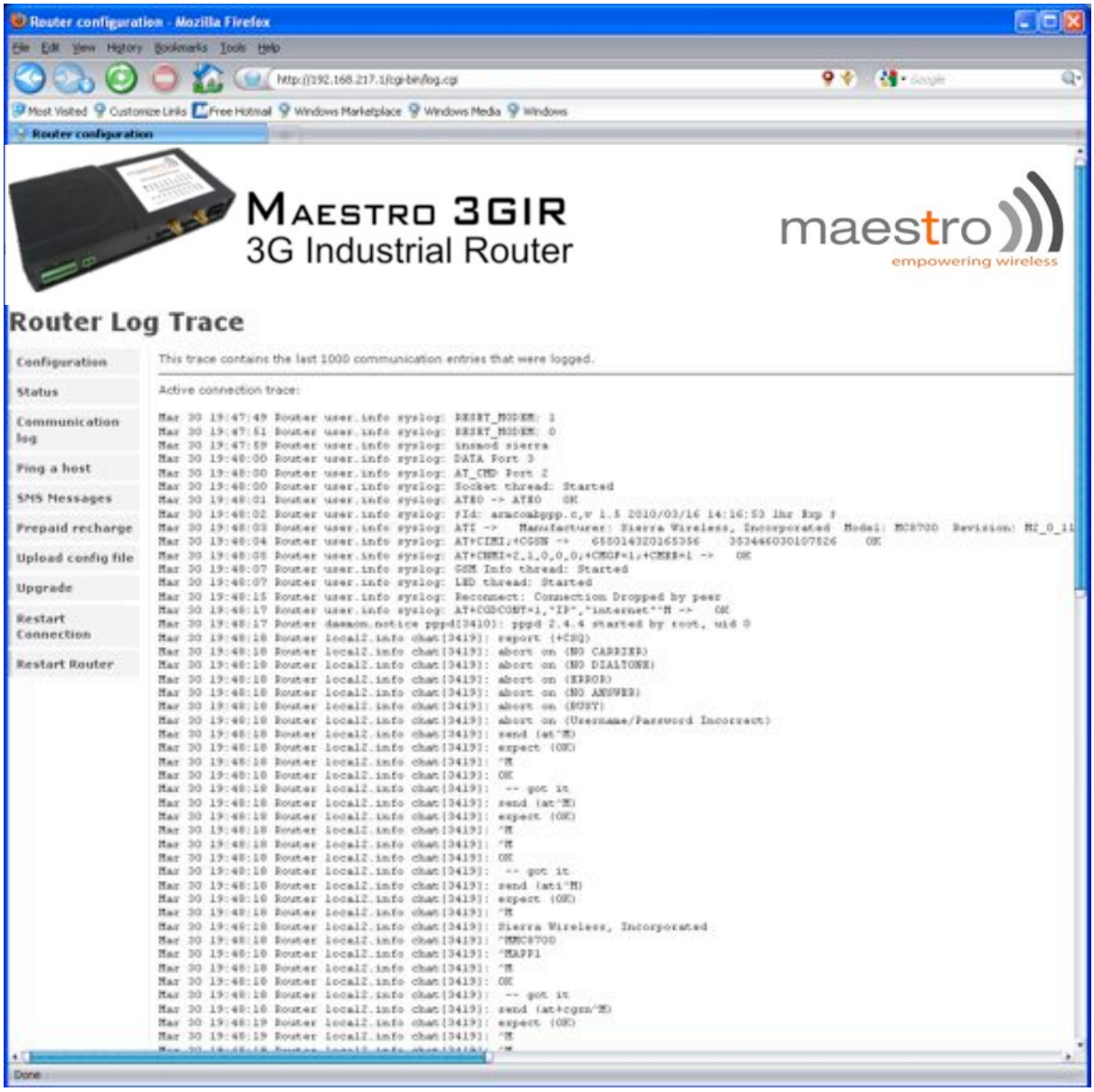
6.2 Communication log

The communication log is used by technical personnel for support. This log can be copied and pasted into an email application to assist technicians in resolving your problem.



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7 SMS MESSAGES

This Interface is for reading SMS messages.

This is handy when your service provider sends you information regarding your data bundle. You can delete single, multiple or all the messages.

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8 PREPAID RECHARGE

This interface provides access to the prepaid balance enquiry and prepaid recharge functions of your service provider

The command string is what you will typically type in on your handset.
For example:

- ***100#** will query and return your current account balance.
- ***100*02#** will query and return your current time window.
- ***100*01*RechargeVoucherNumber#** will load the money from the supplied voucher onto the selected SIM card.

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9 COMPLETE CONFIG

This interface provides your routers complete configuration in a text format. This can also be used by technical personnel for support. The current config text can be copied and pasted into an email application to assist technicians in resolving your configuration problems.

A config file for example received back from the technical support team, can be uploaded by browsing to the desired config file and clicking **submit**.

Config file upload.
Warning: no validation is done on the values submitted from your file. This could render the router unusable.

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10 UPGRADE

This interface allows you to update specific areas of the router.
For Example:
Web interface
USB driver
Connection application etc.

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11 GLOSSARY

Abbreviation	Description
API	Application programmers Interface
ASN.1	Abstract Syntax Notation One
CDR	Charge Data Record
CSV	Comma Separated Values
DB	Database
DNS	Domain Name System
FQDN	Fully Qualified Domain Name
GAIN	Gateway Application and Interface Node
HTTP	Hypertext Transfer Protocol
HTTPS	HTTP Secure
IVR	Interactive Voice Response
I/O	Input/Output
IP	Internet Protocol
LAN	Local Area Network
MMS	Multimedia Message Service
MMSC	Multimedia Messaging Service Centre
PDA	Personal Digital Assistant
SMS	Short Message Service
SMSC	Short Message Service Centre
SMPP	Short Message Peer to Peer Protocol
USSD	Unstructured Supplementary Services Data
WIG	Wireless Internet Gateway
WAN	Wide Area Network
WAP	Wireless Application Protocol
WML	Wireless Mark-up Language
WASP	Wireless Application Service Provider
XML	Extensible Markup Language

12 REVISION INFORMATION

Date	Version	Comments	Author
17 March 2008	1.0	Creation	Tiaan van Aardt
30 April 2008	1.1	Updated screen shots	Tiaan van Aardt
24 June 2008	1.2	Added Chapter 2 (Product Specifications)	Eric Guldemond
25 Sep 2009	1.3	Expand on IP-IP tunnel section	Deon van der Merwe
28 Sep 2009	1.4	Added new Screen captures	Lucas Rossouw
30 March 2010	2.1	Converted for new 3GIR	Lucas Rossouw

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Warning

WARNING: Do not open this equipment under any circumstances. High risk of electrical shock exists that may and probably will lead to injuries and/or death.

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